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Battery driven electromotive scooter - uses DC=DC regulator fed from main battery to provide stabilised supply to auxiliary safety equipment (Eng)

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The scooter has a 48 volt main power source which consists of four 12 volt batteries and supplies power directly to a 48 volt electric motor. The power source also supplies power to a CD-DC switching regulator (5) which reduces the 48 volts to 12 volts and regulates this voltage to provide a stable nominal 12 volt supply for the auxiliary devices.

The auxiliary devices supplied from the regulated supply are lights (3), a control unit (4) and a warning device (7) which is connected to a sounding device. The regulator, which may be a chopper-type switching regulator maintains the nominal 12 volt output even when the voltage of the main power source falls.

ADVANTAGE - Maintains voltage to safety devices as main battery voltage falls to improve safety of operation. (7pp Dwg.No.1/5)

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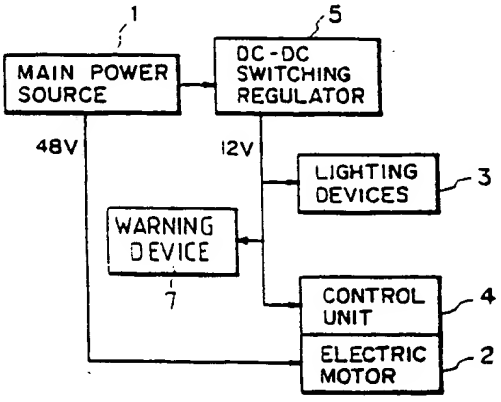

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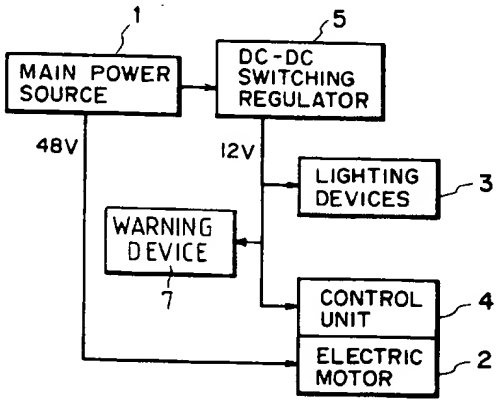
(54) Electromotive scooter.

(57) For an electromotive scooter which gets its driving force from an electric motor driven by batteries mounted thereon, and which has a power source unit for an electromotive scooter which supplies power of nominal value of 48V to the electric motor that requires high voltage to exert high driving performance and also supplies power of nominal value of 12V via an auxiliary power source to the other electric devices in such a manner that even in a case of large fluctuation of voltage in the main power source, a stable power is assured for said electric devices, such a warning device which, by means of a pilot lamp that gives a visual signal and a warning sound that gives an acoustic signal as an equivalence of the sensation of idling of inner combustion engines, tells or warns the rider or nearby people when the switch for the electrical motor is on and the vehicle is ready to run.

FIG. 1



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ble functioning of the operation warning device. The seat hinge, which also works for detection of seat load, has not only its proper freedom of motion for pivoting but also has the freedom for vertical motion, which is restrained always by the spring; hence, there is no backlash at the hinge when the seat is opened or closed, while the hinge functions smoothly for pivoting.

The scope of the broader applicability of the invention will be apparent from the following detailed description of an embodiment using the invention. Various variations and modifications will be apparent from the description below for those skilled in the art, and it should be understood that the following is but a description of one preferred embodiment.

BRIEF DESCRIPTION OF THE DRAWINGS

The description herein of an embodiment of the invention is made with reference to the accompanying drawings wherein;

Fig. 1 is a schematic block diagram showing the connection of the electric units and devices of an electromotive scooter accoring to the invention;

Fig. 2 is a side view, partly broken away, of the electromotive scooter;

Fig. 3 is a schematic diagram showing a circuit of a driving operation warning device;

Fig. 4 is a plan view showing the instrument panel; and

Fig. 5 is a sectional view showing the details of the seat hinge portion of the seat.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Fig. 1 is a schematic block diagram showing the connection of electric units and devices of an electromotive scooter of the invention, and Fig. 2 is a side elevational view of said electromotive scooter. The main power source 1 has nominal voltage of 48V and consists of four batteries of nominal voltage of 12V connected in series and mounted in a battery room 6 provided in the lower part of the scooter frame. The main power source 1 is connected directly to the electric motor 2 by means of cables.

As electric motor 2, a motor specified for nominal voltage of 48V is used. The electromotive scooter, therefore, has an excellent driving performance comparable to that of a scooter having an inner combustion engine owing to the big driving force of said electric motor.

A DC-DC switching regulator converter 5, which works as an auxiliary power source, is provided adjacent the main power source 1 in the battery room 6. Said DC-DC switching regulator 5 gets nominal 48V power from the main power source 1, reduces and regulates it to a stable power of nominal 12V, and supplies it to the auxiliary devices such as the control unit 4, lighting devices 3 and the warning device 7. Since the DC-DC switching regulator 5 supplies a stable nominal 12V power even if the main power source 1 undergoes large voltage fluctuation, the lighting devices 3 can keep adequate brightness and the control unit 4 and the warning device 7 can operate stably. As DC-DC switching regulator 5 can be employed, for example, a chopper-type switching regulator. This type of regulator can operate normally even when the voltage of the power from the main power source 1 drops to 25V which is far below the allowable voltage value of 38V for the driving unit 2. This enables the maintenance of adequate brightness of the lighting devices 3 and prevention of runaway accidents through stable functioning of the control unit 4. As DC-DC switching regulator 5 can be used not only said chopper-type, but also voltage regulator circuits such as an insulated-type switching regulator or a dropper-type which regulates voltage drops.

The auxiliary devices, that is, the control unit 4, the lighting devices 3 and the warning device 7 which are supplied with the constant voltage value from the main power source 1, are all those specified for use with nominal 12V and hence can be selected efficiently from a great variety of products on the market manufactured in large quantities for general automotive use. The control unit 4 controls mainly the driving unit (electric motor) 2.

The operation warning device shown in Fig. 3 consists of the start-key switch 15 for the electromotive scooter, the pilot lamp 8 provided on the instrument panel 16 as a power source indicator, the buzzer 17 which is a warning sound generator provided in the front cowl 18 of the steering unit and the switch 14 which is attached to the seat hinge 12 of the seat 11 and works as a seat load sensor. The seat 11 also plays the role of a cover of the luggage box 9 for accommodating a helmet, etc.

The start-key switch 15 is on the one hand for on-off operation of the main power source 1 of the electric motor 2 and on the other hand for the lighting of the pilot lamp 8 through the auxiliary power source 5 as shown in Fig. 3; the electromotive scooter is brought into the ready-to-run condition through turning on this switch 15. The pilot lamp 8 is always lighted when the start-key switch is on (the scooter is ready to run) and tells or warns the rider visually that the motor is ready to go into running motion in direct response to throttle operation (accelerator operation). The instrument panel 16 is provided on the upper surface of the steering unit for the sake of better visibility and included, besides the pilot lamp 8, a speedometer 21, an odometter 22, a battery indicator 23, a speed warning light 24, a temperature indicator 25, a charge indicator 26, and turning signal indicators 27.

The buzzer 17 is to give acoustical warnings to the rider and nearby people and is provided in the

front cowl 18 of the steering unit. The sound volume of the buzzer 17 is set to the level necessary and adequate to arouse attentoion of the rider.

The switch 14 which constitutes the seat load sensor, is a kind of micro switch and tells the existence of a seat load through on-off action. As shown in Fig. 5, the switch 14 is attached to the seat hinge 12 of the seat 11. The seat hinge 12 is provided under the seat 11 and enables the seat 11 to be raised up or turned down for opening and closing of the luggage box 9. The locking device 10 locks the seat 11 in its closed position. The seat hinge 12 consists of a fixed hinge piece 12a on the side of the luggage box 9 and a movable hinge piece 12b on the side of the seat 11, which are connected together by means of a horizontal hinge shaft 12c. This seat hinge 12 has not only its proper freedom of motion for rotation but also a freedom for vertical motion and serves to the purpose of on-off operation of the switch 14 fixed to said hinge piece 12a through an attachment piece 19. Said freedom of vertical motion is, however, restrained by a vertical spring 13 mounted there. As the rider sits on the seat 11 and takes a driving position, the forward portion of the seat 11 moves down and the switch 14 is turned on.

The construction being as stated above, the switch 14 is actuated without fail when the rider sits on the seat 11 or lifts his weight from the seat 11 regardless of the position on the seat 11 where the rider sits.

In the construction described above, as the key switch 15 is turned on, the pilot lamp 8 is lighted and the electromotive scooter comes into the ready-to-run condition. Then, if the rider gets into the riding position, the switch 14, that is, the seat load sensor detects it and is turned off. But, if the switch 14 remains in the on-condition, that is, the rider is not in the riding position after the key switch 15 is turned on, then the buzzer 17 gives out a warning and urges the rider either to sit on the seat or to turn off the key switch 15.

Claims

1. An electromotive scooter comprising a power source unit having a main power source (1) which supplies high-voltage power to a driving unit (2) and an auxiliary power unit (5) which, regulating the power from said main power source, generates and supplies a stable low-voltage power to lighting devices (3), a control unit (4) and at least a warning device (7) that operates from said low-voltage power.

2. The electromotive scooter of Claim 1, wherein said main power source is a set of storage batteries of total nominal voltage of 48V and wherein said auxiliary power source is a DC-DC switching regulator which generates stably a power of nominal voltage of 12V and supplies said 12V power to auxiliary devices such as lighting devices and a control unit that operates with said 12V power.

3. The electromotive scooter of Claim 1, wherein said warning device comprises;

a power source indicator which provides a visualisation of the driving condition of the scooter;

a seat load sensor which detects if a rider is on the rider's seat; and

a warning sound generator which gives an acoustical warning when the electromotive scooter is in the driving condition and the rider is not in his riding position on the seat.

4. The electromotive scooter of Claim 3, wherein

said power source indicator is a pilot lamp which indicates if the scooter is ready to run by means of an on-off light;and wherein

said seat load sensor includes a switch which is provided in the seat hinge portion supporting the seat and which tells if a seat load exists through on-off action thereof, a spring provided to restrain vertical motion of said seat hinge.

FIG. 1

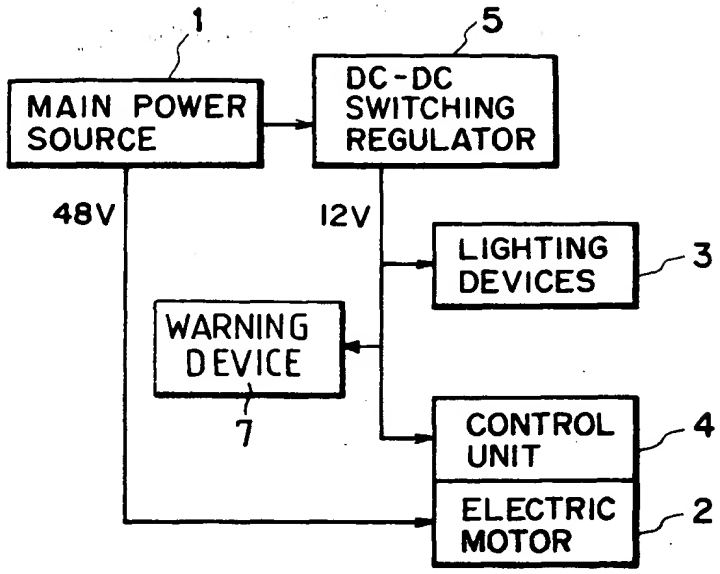
1
5
MAIN POWER SOURCE
DC-DC SWITCHING REGULATOR
48V
12V
LIGHTING DEVICES
3
WARNING DEVICE
7
CONTROL UNIT
4
ELECTRIC MOTOR
2

FIG. 2

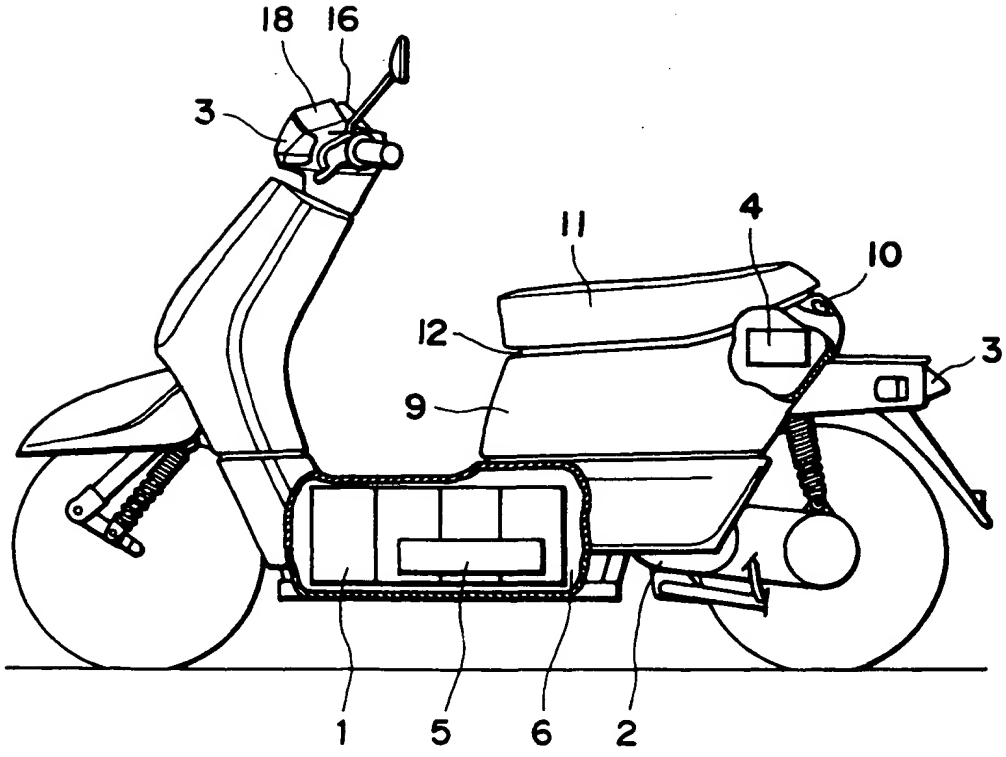
18
16
3
11
4
10
12
3
9
1
5
6
2

FIG. 3

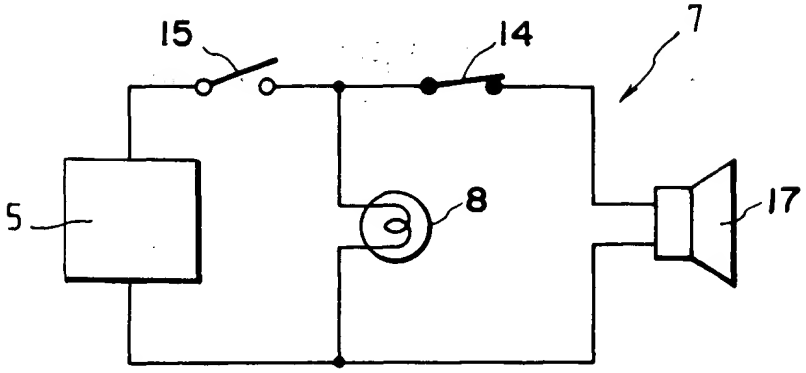

FIG. 4

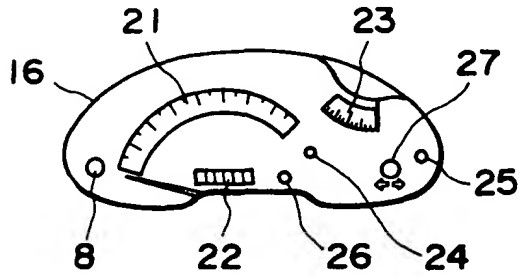

FIG. 5